

# Thermal-Catalytic Ignition Source for Ionic Liquid Monopropellants, Phase I

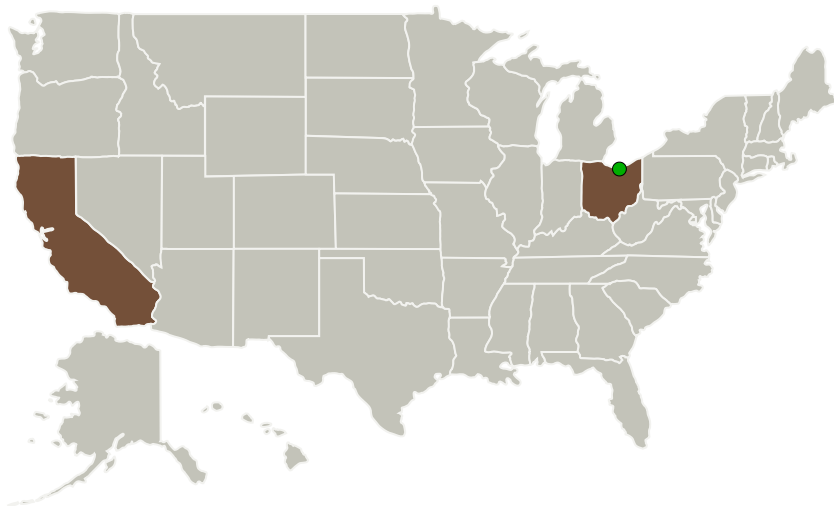
Completed Technology Project (2012 - 2012)



## Project Introduction

Ultramet recently demonstrated rapid, reliable, and repeated ignition of hydroxylammonium nitrate (HAN)-hydroxyethylhydrazinium nitrate (HEHN) monopropellant mixtures. Before this milestone was achieved, the feasibility of using this advanced ionic liquid monopropellant was distant. In this project, Ultramet will build on that success and develop novel architectures and the related processing to render a thermal ignition source based on resistive heating of refractory monolithic open-cell foam. In Phase I, prototype igniters and an oxide-iridium/rhenium thruster appropriate for an attitude control system will be designed and fabricated. Engine testing with AF-315E and ammonium dinitramide (ADN) monopropellants will be performed at the Jet Propulsion Laboratory (JPL) at no cost to the project. In Phase II, longer hot-fire testing would be performed with both monopropellants at JPL and/or industry partners Aerojet, AMPAC-ISP, Northrop Grumman, or ATK, all of which have expressed interest in the technology. ADN and HAN/HEHN green monopropellants offer many improvements over hydrazine, including increased specific impulse and density specific impulse, as well as greater safety in terms of toxicity and insensitivity, which will significantly decrease overall propulsion volume, mass, and cost. Because the thermal bed is nondiscriminate to the propellant, additional propellants may be included in follow-on testing.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Ultramet	Lead Organization	Industry	Pacoima, California
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

## Project Transitions

**February 2012:** Project Start

**September 2012:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139523>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Ultramet

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

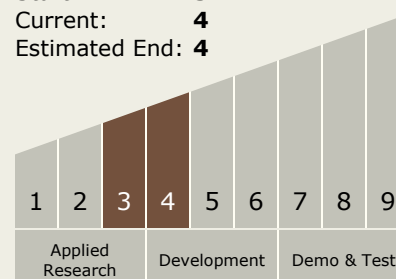
Carlos Torrez

## Principal Investigator:

Matthew J Wright

## Technology Maturity (TRL)

Start: **3**  
 Current: **4**  
 Estimated End: **4**



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## Technology Areas

### Primary:

- TX01 Propulsion Systems
  - └ TX01.1 Chemical Space Propulsion
    - └ TX01.1.2 Earth Storable

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System